S-69-4

5230

EVALUATION OF SCLERODERRIS CANKER ON NATIONAL FOREST LAND IN THE LAKE STATES-- 1968 INTERIM REPORT

By James T. O'Brien, Pathologist

SUMMARY

Since 1966, plots established in selected red pine plantations have been examined to evaluate Scleroderris canker, a disease caused by Scleroderris lagerbergii Gremmen. The 1968 examination revealed only a slight increase in trees infected (about 1%) and in tree mortality due to the pathogen (less than 1%) since the 1967 examination. In general, the fungus was less active in 1967-68 than in 1966-67.

INTRODUCTION

In 1966, plots were established to evaluate the spread of and damage caused by the pathogenic fungus Scleroderris lagerbergii Gremmen within infected red pine plantations in the Lake States. The study plots are in 31 plantations located on the Nicolet and Chequamegon National Forests in Wisconsin and on the Ottawa and Hiawatha National Forests in Upper Michigan.

This is the second interim report covering the annual re-examinations of the plots. It compares the initial (1966), 1967, and 1968 results.

OBJECTIVES

The objectives of the evaluation are: (1) to determine the annual rate of spread of S. lagerbergii within the infected red pine plantations on the four forests (2) to determine the annual rate of mortality caused by this pathogen within the infected plantations, and (3) to correlate the rates of disease spread and red pine mortality with host age.

METHODS

The methods of plantation selection and examination were described fully in the 1967 report 1/ and are only briefly reviewed here. Plantations from which selections were made included only those found infected in a 1965 survey. These were divided into two age groups-- 7-10 years old and 4-6 years old. Two to five plantations in each age group were selected per Forest. Approximate locations of the plantations selected are shown on the map (Figure I).

1/ O'Brien, J. T. Evaluation of Scleroderris Canker on National Land in the Lake States - Plot Establishment and Progress Report - 1967 (Available from the St. Paul Field Office).

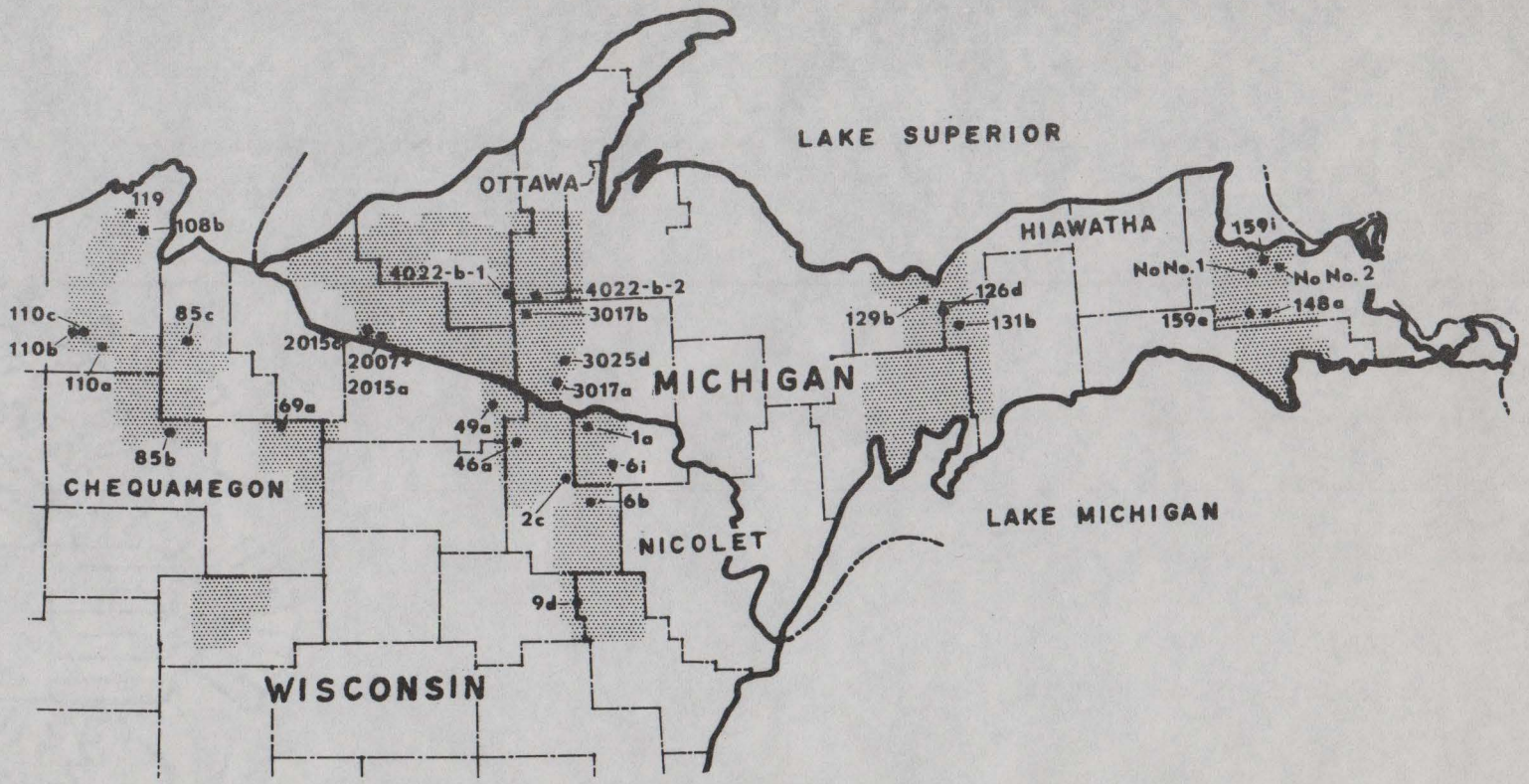

FIGURE I. APPROXIMATE LOCATIONS OF PLANTATIONS WITH SCLERODERRIS CANKER SPREAD PLOTS.

Five square, 1/20th acre permanent plots were established in each plantation except for three plantations on the Ottawa National Forest. In these, only four plots per plantation were established. Each tree on each plot is examined annually and classified as to condition and to disease symptom expression. The most reliable diagnostic symptom of infection by S. lagerbergii is a yellow-green discoloration of the wood beneath the bark of damaged tree parts.

RESULTS AND DISCUSSION

The results of the initial (1966), 1967, and 1968 examinations of the spread plots are summarized in Tables I and II. Information by Forest is presented in the Appendix (Tables I-IV). The following terminology is used in the tables:

1. "Age group" indicates plantation age group in 1966. Plantations in the 7-10 year age group were planted between spring 1957 and fall 1959. Those in the 4-6 year age group were planted between spring 1960 and fall 1962.

2. Except for Table II, which shows "percent of dead trees infected," all percent calculations are based on the number of trees found on the plots at the time of establishment (1966). 2/

3. An "infected" tree is defined as a damaged tree showing the characteristic yellow-green discoloration of the wood inside bark in the damaged portion. Cankered or damaged trees without the discoloration were not considered infected.

4. "Trees dead" indicates the percent of tree mortality due to all causes. The portion of these dead trees infected and presumably killed by S. lagerbergii is shown in Table II.

2/ The tables show higher percentage values for the 1966 and 1967 data than were shown in the 1967 report. This results from the exclusion of "missing" trees (i.e. empty spaces where presumably a tree was planted) that were noted in 1966 when the plots were established. Excluding these "trees" changes the bases of the percentages--and therefore the values-- from those given in the 1967 report. However, the general picture presented is not appreciably altered.

In general, the data indicates that the 1968 increases, both in disease spread and tree mortality, were less than in 1967. Table I shows that the percent of infected trees increased from an average of 15.4% in 1967 to 16.5% in 1968--or 1.1%. This compares to an increase from 11.6% to 15.4% between 1966 and 1967-- or 3.8%. In fact, percent of infection decreased in a few plantations when infected branches of some trees were broken off--probably by snow. Tree mortality declined from 3.7% in 1967 to 1.0% in 1968.

TABLE I. CUMULATIVE AND ANNUAL INFECTION AND TREE MORTALITY ON SCLERODERRIS CANKER STUDY PLOTS, 1966-1968

Plantation Age Group	Trees Present in 1966	Percent of Trees Infected					Percent of Trees Dead				
		Cumulative			Annual Increase		Cumulative			Annual Increase	
		1966	1967	1968	1967	1968	1966	1967	1968	1967	1968
7-10	3346	16.5	23.2	24.7	6.7	1.6	7.6	10.1	10.5	2.5	0.4
4-6	4770	8.2	9.9	10.7	1.7	0.8	10.8	15.6	17.0	4.8	1.4
Total	8116	11.6	15.4	16.5	3.8	1.1	9.6	13.3	14.3	3.7	1.0

In 1968, as in 1967, the overall annual increase in infection was greater in the older plantations than in the younger. The average increase was 1.6% in the 7-10 year age group and 0.8% in the 4-6 year age group (Table I). Again the increase in tree mortality averaged lower in the 7-10 year age group-- 0.4%, versus 1.4% in the 4-6 age group. The proportion of 1968 mortality caused by S. lagerbergii was the same for both age groups-- .58 or 58% (Table II). This appears to be a change from previous examinations, when a higher proportion was found in the older group. However, only 14 trees in the 7-10 year age group died in 1968, probably too few to be conclusive.

TABLE II. PROPORTION OF TREE MORTALITY PRESUMED CAUSED BY S. LAGERBERGII

Age Group	Proportion of Dead Trees Infected (Discolored)			
	1966	1967	1968	Cumulative (all years)
7-10	.63	.56	.58	.61
4-6	.43	.39	.58	.43
Average	.50	.43	.58	.48

European experience with Scleroderris canker indicates that the damage from the disease fluctuates. It causes considerably more damage in some years than others. 3/ In the Lake States, the disease apparently caused little damage in 1968.

3/ Kohh, E. 1964. Om tallens gren-och granens topptorka och dess bekämpning. Skogen 51: 200-203

APPENDIX

TABLE I. CUMULATIVE INFECTION AND TREE MORTALITY ON SCLERODERRIS CANKER STUDY PLOTS, 1966-1968

CHEQUAMEGON NATIONAL FOREST

Age Group	District	Plantation	Trees Present in 1966	Trees Infected (Percent)			Trees Dead (Percent)		
				1966	1967	1968	1966	1967	1968
7-10	Washburn	108b	324	32.1	65.4	69.4	4.6	6.5	7.1
		110a	249	10.0	12.4	12.8	6.8	8.4	8.4
		110b	186	11.8	13.4	12.4	7.0	7.5	7.5
		110c	201	15.4	21.9	23.4	7.5	9.4	9.4
	Total or Average		960	19.0	32.5	34.1	6.2	7.8	8.0
4-6	Park Falls	69a	257	7.4	9.7	9.7	8.2	12.8	12.8
	Glidden	85b	141	6.4	8.5	9.2	9.2	11.3	12.8
		85c	250	9.2	11.6	12.0	10.0	14.0	14.0
	Washburn	119	253	9.5	11.5	11.5	18.2	25.7	26.9
	Total or Average		901	8.3	10.5	10.8	11.6	16.5	17.1
Forest Total or Average			1861	13.8	21.9	22.9	8.9	12.4	12.7

TABLE II. CUMULATIVE INFECTION AND TREE MORTALITY ON SCLERODERRIS CANKER STUDY PLOTS, 1966-1968

NICOLET NATIONAL FOREST

Age Group	District	Plantation	Trees Present in 1966	Trees Infected (Percent)			Trees Dead (Percent)		
				1966	1967	1968	1966	1967	1968
7-10	Florence	1a	310	2.3	4.8	5.2	2.3	4.2	4.5
		2c	385	0.8	1.0	1.3	1.0	2.0	2.0
	Total or Average		695	1.4	2.7	3.0	1.6	3.0	3.2
4-6	Three Lakes	46a	312	5.8	7.4	7.7	8.3	22.1	24.0
	Eagle River	49a	334	21.3	25.2	26.0	13.8	21.0	22.8
	Laona	6b	192	4.7	5.2	5.2	9.9	15.1	16.7
	Florence	6i	341	4.4	5.6	5.6	7.9	12.0	12.6
	Lakewood	9d	301	0.3	0.7	0.7	3.0	3.6	3.6
	Total or Average		1480	7.7	9.3	9.6	8.6	14.9	16.0
Forest Total or Average			2175	5.7	7.2	7.5	6.3	11.0	11.9

APPENDIX

TABLE III. CUMULATIVE INFECTION AND TREE MORTALITY ON SCLERODERRIS CANKER STUDY PLOTS, 1966-1968

OTTAWA NATIONAL FOREST

Age Group	District	Plantation	Trees Present in 1966	Trees Infected (Percent)			Trees Dead (Percent)		
				1966	1967	1968	1966	1967	1968
7-10	Iron River	3017a	146	8.9	11.6	13.0	8.2	12.3	12.3
		3017b	209	13.4	16.8	18.2	9.6	12.0	13.4
	Bessemer	2007	196	16.3	18.9	19.4	7.6	10.7	11.7
	Total or Average		551	13.2	16.2	17.2	8.5	11.6	12.5
4-6	Bessemer	2015a	221	7.7	7.7	10.4	13.6	15.4	16.3
		2015c	215	9.3	9.8	11.6	13.0	18.6	19.1
	Iron River	3025d	198	6.6	6.6	6.6	11.1	15.1	15.7
	Kenton	4022b-1	330	20.6	21.8	22.7	12.4	19.1	20.0
		4022b-2	294	4.8	6.5	7.5	6.8	11.6	13.3
	Total or Average		1258	10.5	11.3	12.6	11.2	16.0	16.9
Forest Total or Average			1809	11.3	12.8	14.0	10.4	14.7	15.6

TABLE IV. CUMULATIVE INFECTION AND TREE MORTALITY ON SCLERODERRIS CANDER STUDY PLOTS, 1966-1968

HIAWATHA NATIONAL FOREST

Age Group	District	Plantation	Trees Present in 1966	Trees Infected (Percent)			Trees Dead (Percent)		
				1966	1967	1968	1966	1967	1968
7-10	Munising	126d	261	45.2	53.6	58.6	25.3	33.3	33.7
		129b	306	32.4	41.8	40.8	5.2	6.5	7.2
	Soo	48a	314	12.4	15.9	16.6	8.6	11.5	11.5
	Munising	131b	259	12.4	14.7	21.2	10.0	13.1	13.5
	Total or Average		1140	25.3	31.2	33.7	11.8	15.5	15.9
4-6	Soo	No No. 2	298	8.4	10.7	10.4	24.8	30.8	34.9
		No No. 1	229	4.8	7.9	12.2	6.1	8.3	10.0
		159e	321	3.7	3.7	4.4	8.7	9.9	10.6
		159i	283	7.8	12.7	14.8	8.5	11.7	15.9
	Total or Average		1131	6.2	8.7	10.2	12.4	15.6	18.2
Forest Total or Average			2271	15.7	20.0	22.0	12.1	15.5	17.0